

*REMARKS/ARGUMENTS*

The following remarks are responsive to the points raised by the Office Action dated July 21, 2005. In view of the following remarks, reconsideration is respectfully requested.

Claims 1-6 have been cancelled as drawn to a nonelected invention. Claims 7-9 have been amended to improve the form of the claims. No new matter has been added, and the basis for the amended claim language may be found in the original specification, claims and drawings.

Claims 7-9 were rejected under 35 U.S.C. § 103 as unpatentable over U.S. Patent No. 6,323,131 to Obeng et al. (hereinafter, "Obeng") in view of U.S. Patent No. 6,905,958 to Gracias et al. (hereinafter, "Gracias"). This rejection is respectfully traversed for two independent reasons.

Independent claim 7 is directed to an underlayer film for copper, disposed on a substrate. An  $(R_1R_2)P-(R)_n-Si$  group on the film is bonded to the substrate via an Si-O bond.  $R_1$  and  $R_2$  each represent an alkyl group, R represents a divalent linear organic group selected from the group consisting of an alkylene group, an aromatic ring, and an alkylene group including an aromatic ring, and n is an integer from 1 to 6.

Independent claim 9 encompasses a semiconductor device comprising the underlayer film for copper of claim 7.

According to the Office Action, Obeng teaches an underlayer film 18 for copper 20 on a substrate 12 where the underlayer film includes  $(R_1R_2)N-(R)_n-Si$  bonded to a substrate via an Si-O bond, where  $R_1$  and  $R_2$  represent an alkyl group, R represents an alkylene group or an aromatic ring, and n represents an integer from 1 to 6 (col. 2, line 60 – col. 3, line 20). The Office Action correctly acknowledged that Obeng does not disclose phosphorus in place of nitrogen. The Office Action also characterized Gracias as teaching an underlayer film where a phosphine is used in the self-assembled monolayer film (col. 3, lines 30-35). According to the Office Action, it would have been obvious to one of ordinary skill in the art to use phosphorus in the device of Obeng since Gracias teaches that these materials readily form bonds to copper layers.

A *prima facie* case of obviousness requires, at least, that the combination of references disclose each and every element of the claims. A *prima facie* case of obviousness

has not been set forth in the Office Action because the proposed combination of Obeng with Gracias fails to disclose every element of the claims pending in this application.

Obeng teaches that passivating organic films are comprised of long alkyl chain silanes, carboxylic acids, and thiols, and that preferred films are formed from molecules having the formula  $X[\text{CH}_2(\text{CH}_2)_n\text{-O-C(O)CH}_2\text{C(O)CH}_3]_2$  where X is S, Si or N, n is from 2 to 6 or 18 (“the Obeng formula”) (Obeng, col. 2, lines 62-67). The Obeng formula does not read on the claimed formula, as alleged in the Office Action, for several reasons.

The claimed formula includes a tri-substituted phosphorus. The structure that results when X is nitrogen in the Obeng formula includes a di-substituted nitrogen, not a tri-substituted nitrogen like the tri-substituted phosphorus in the claimed formula. In fact, nowhere does Obeng or Gracias disclose an underlayer film for copper that includes a tri-substituted phosphorus, as claimed.

Additionally, the claimed  $(\text{R}_1\text{R}_2)\text{P}(\text{R})_n\text{-Si}$  group includes both silicon and phosphorus. In the Obeng formula, X can be S, Si or N (col. 2, lines 65-66). When X is N, there is no Si in the Obeng formula such that a  $(\text{R}_1\text{R}_2)\text{P}(\text{R})_n\text{-Si}$  group can bond to the substrate via an Si-O bond. None of the possible additional terminal groups mentioned in column 3, lines 2-4 add any silicon to the Obeng formula. Nor do any of the other possible passivating organic films mentioned at column 3, lines 5-8 of Obeng include both silicon and phosphorus. Thus, Obeng does not disclose an underlayer film for copper in which a  $(\text{R}_1\text{R}_2)\text{P}(\text{R})_n\text{-Si}$  group bonds to a substrate via an Si-O bond, as claimed.

Moreover, the structure of the molecules that are formed from the Obeng formula is quite different from the structure of the molecules formed by the claimed formula. Molecules of the Obeng formula form the exemplary structure shown in Figure A below:

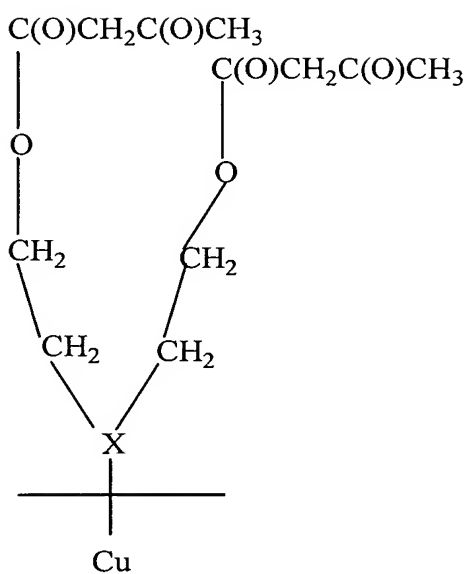


Figure A

Molecules of the claimed formula form the exemplary structure shown in Figure B below:

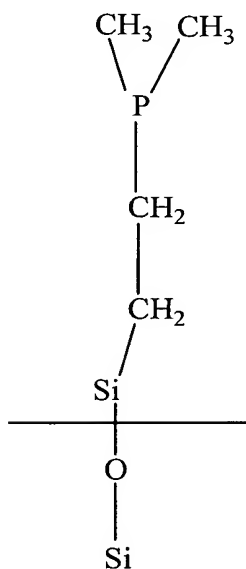


Figure B

Clearly, the molecules of the present claims have a very different structure that does not read on the Obeng formula, as alleged in the Office Action.

For the reasons set forth above, neither Obeng nor Gracias, either alone or in combination, discloses every element of presently pending claims 7-9. Thus, the Office Action has not set forth a *prima facie* case of obviousness, and the rejection under 35 U.S.C. § 103 cannot be maintained.

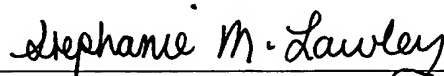
Claim 8 depends from and includes all the limitations of claim 7. Therefore, claim 8 is patentable for the same reasons as claim 7.

Applicants alternatively traverse the rejection by supplying a certified English language translation of the priority patent application, Japanese patent application 2002-359525, in accordance with 37 C.F.R. § 1.55. The priority patent application was filed in Japan on December 11, 2002. The effective date of Gracias, July 25, 2003, is well after the filing date of the priority patent application. Because Gracias was filed after the priority document, and the Applicants have perfected their priority claim in accordance with 37 C.F.R. § 1.55, Gracias cannot be applied and must be withdrawn as prior art to the subject patent application. The § 103 rejection relying on Gracias must likewise be withdrawn.

For the reasons set forth above, reconsideration and withdrawal of the rejections is respectfully requested.

If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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